

Iridoschisis and Glaucoma

BY JOHN MARK S. DE LEON, MD, AND ROLAN A. MANGAHAS, MD

CASE PRESENTATION

A 52-year-old man presented to the Veterans Memorial Medical Center Eye Department in Quezon City, Philippines, for a second opinion. He had been diagnosed with glaucoma 6 months earlier after experiencing episodes of sudden blurring and redness in his right eye. He instilled one drop of bimatoprost in his right eye every night. He had no history of eye surgery, eye trauma, or laser iridotomy, although both of his irides looked like they had undergone poorly performed inferior peripheral iridotomies. Both iris lesions demonstrated transillumination.

On examination, the patient's visual acuity was 20/200 OD, improving with pinhole testing to 20/100, and 20/20 OS. The slit-lamp examination showed conjunctival congestion with a 4-mm, sluggishly reactive pupil in his right eye. There was iris atrophy with stromal detachments at the periphery of the iris at the 5- to 7-o'clock positions, and iris strands were visible floating in the anterior chambers of both eyes (Figure 1). There was a +1 cortical cataract in the patient's right eye, but the lens in his left eye was clear. The cup-to-disc ratios were 0.8 OD and 0.5 OS. The IOPs measured 53 mm Hg OD and 18 mm Hg OS with a Goldmann applanation tonometer.

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Four-mirror gonioscopy in the patient's right eye revealed closed angles with 60° inferior peripheral anterior synechiae and iris strands touching the cornea at the 5-o'clock position. His left eye had closed angles with 30° inferior peripheral anterior synechiae. The irides had a convex configuration, and both eyes had 360° iridotrabecular apposition. The Octopus (Haag-Streit USA Inc., Mason, OH) revealed far-advanced glaucomatous visual field loss in his right eye and moderate glaucomatous visual field loss in his left eye (Figure 2).

Our working impression was of iridoschisis with angle-closure glaucoma (ACG) in both eyes, far advanced in the right and moderate in the left.

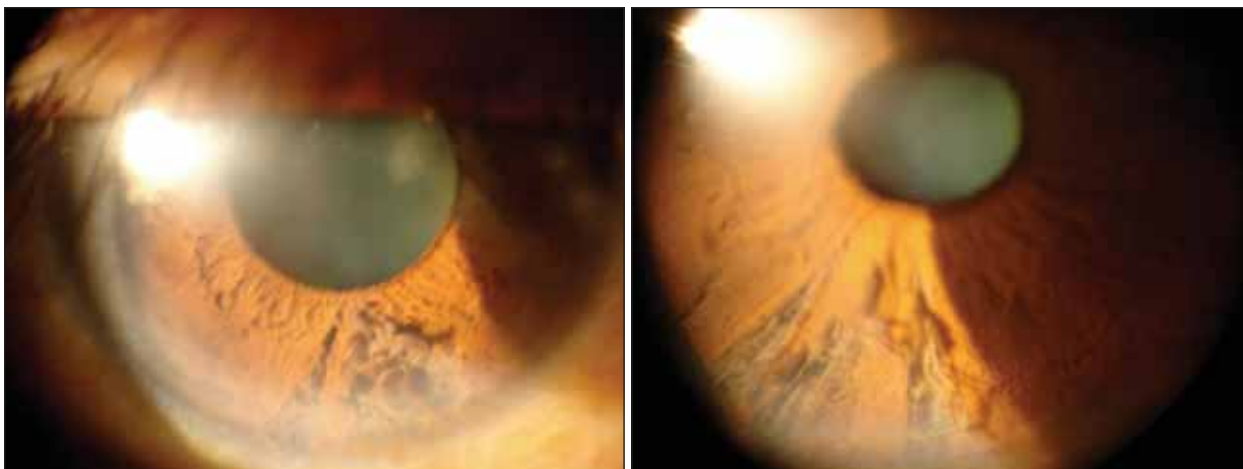


Figure 1. Anterior segment photograph of the patient's right eye shows an inferior (5 o'clock) frayed iris with transillumination defects (A). Anterior segment photograph of his left eye shows sectoral areas (6-8 o'clock) of frayed iris tissue with transillumination defects (B).

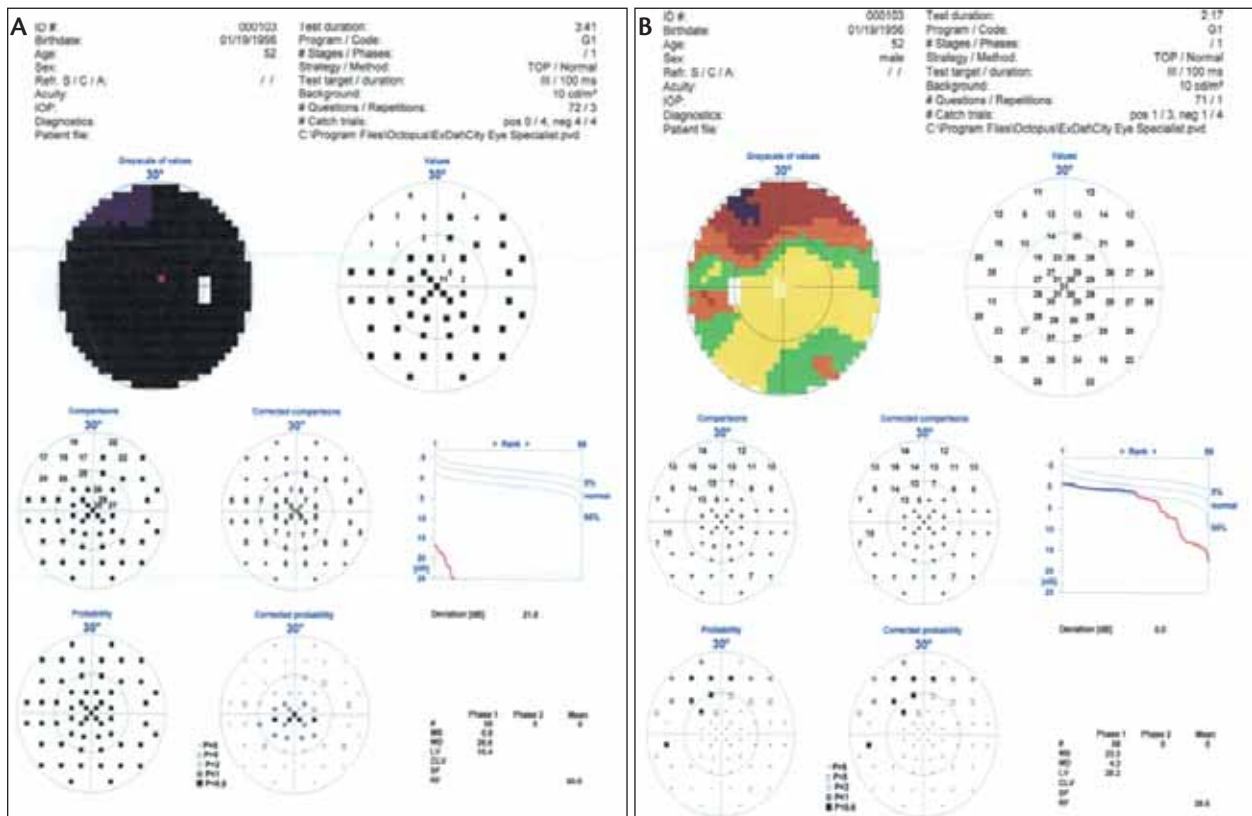


Figure 2. Visual field of the patient's right eye shows a nearly total absolute scotoma that may be compatible with far-advanced glaucomatous optic neuropathy (A). Visual field of his left eye shows a superior arcuate defect that may be compatible with mild-to-moderate glaucomatous optic neuropathy (B).

HOW WOULD YOU PROCEED?

- If the IOP in the patient's right eye remains uncontrolled despite maximum medical therapy, would you perform a combined surgical procedure (trabeculectomy and phacoemulsification) or a trabeculectomy alone on that eye, since there is also an existing mild cataract?
- If you planned phacoemulsification on his right eye, whether combined with the trabeculectomy or alone at a later date, how difficult would the procedure be due to the iridoschisis? Would dilation be a problem? Would the iris strands get in the way?
- Would a laser iridotomy benefit the patient's left eye? How would an eye with iridoschisis respond to such a procedure?

SURGICAL COURSE

After the examination, we prescribed acetazolamide 250 mg divided b.i.d. He was eventually on maximally tolerated medical therapy in his right eye, but the IOPs remained uncontrolled. He underwent a trabeculectomy alone in his right eye. Peripheral iridectomy was also performed.

OUTCOME

There were no posttrabeculectomy complications in the patient's right eye, and his visual acuity improved to 20/50, with an IOP of 10 mm Hg. He underwent a laser iridotomy on his left eye, which opened the angle to some degree, but it was difficult to assess because of the floating iris tissues blocking the view. Therapy consisting of one drop of bimatoprost q.h.s and one drop of dorzolamide b.i.d. maintained an IOP of 8 mm Hg in this eye. The cataract in the right eye eventually advanced, and the patient underwent uneventful phacoemulsification with a 5-mm dilated pupil 19 months after trabeculectomy. The only difficulty encountered intraoperatively was billowing of the iris strand toward the phaco probe's tip. A Nagahara Chopper (ASICO, LLC, Westmont, IL) helped to push away these strands.

DISCUSSION

Iridoschisis is the separation of the anterior from the posterior layers of the iris stroma and muscle. The anterior iris stroma splits into strands. The loose ends appear frayed and wave in the aqueous humor of the

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anterior chamber. This rare condition is generally bilateral and typically affects the inferior quadrants of the iris.¹ In 1922, Schmitt first reported iris splitting, but it was Loewenstein and Foster in 1945 who proposed the term *iridoschisis* after presenting the first histopathological study of this condition.² An association of iridoschisis with ACG has been established,³ but the specific etiology of iridoschisis and its relationship to ACG remain obscure.

That iridoschisis and glaucoma are closely associated in approximately half of the reported cases led to the question of a causal relationship between the two, especially ACG, which was reported to occur in approximately 40% of eyes with iridoschisis.⁴ A review of 72 cases of iridoschisis found that it was more associated with ACG (28/72) than open-angle glaucoma (2/78).¹ Although ACG is relatively common, iridoschisis is rare.⁴ Iridoschisis not associated with glaucoma occurs in elderly patients (usually in their 70s), but there have been three reports of iridoschisis without glaucoma in juveniles as young as 11 years.^{1,5-7} Iridoschisis does not seem to be gender specific. Nor does there appear to be genetic involvement.⁴

Iris stromal avascular necrosis in patients with elevated IOP has been proposed to lead to iridoschisis and has been supported by evidence of hyalinization of the anterior stromal vessels and dissolution of the vessels in the deep stromal layers near the dilator muscles.⁸ Danias et al,⁴ however, detected no significant vascular abnormalities in their own case reports of iridoschisis. Others have argued that the stromal changes are not likely to be related to ischemia.⁹

A proposed etiology for iridoschisis was the prolonged use of miotics among glaucoma patients. The taut radial fibers of the iris might rupture as they gradually weakened with time,¹⁰ and another study suggested a mechanical shearing action caused tearing of the iris stroma with the use of miotics.¹¹ Arguments were raised that miotics have been used as a mainstay of glaucoma therapy for decades and few miotic users develop iridoschisis.¹

Iridoschisis due to trauma has been proposed by Lowenstein et al.¹² They suggested that trauma causes an IOP spike that shears along the dilator fibers, splitting the anterior and posterior portions of the iris stroma. Others argued against this idea based on the bilaterality of most cases reported along with the absence of any history of trauma in most reported cases.¹

Danias et al⁴ showed through high-frequency ultrasound how the intact iris posterior pigment epithelium may drape over the anterior lens capsule and cause a pupillary block. The ultrasound also revealed how the separated iris anterior stromal fibers may bow forward and obstruct the angle.

The etiology of iridoschisis remains obscure. Nonetheless, our case demonstrates the importance of an awareness of the associations between the characteristics and telltale appearance of the iris in iridoschisis and glaucoma. This is especially true with ACG, which can have devastating consequences in asymptomatic cases. A thorough evaluation for glaucoma will allow early intervention when appropriate. □

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